Integrating Drought Research:
The 2011-Current Tex-Mex Drought

1. Understanding

The current Tex-Mex drought has been linked to the winter 2010-2011 La Nina conditions, which also redeveloped in winter 2011-2012. The episodic cooling of the tropical Pacific Ocean often brings warmer and drier average conditions across the southern US, as shown in Figure 1.
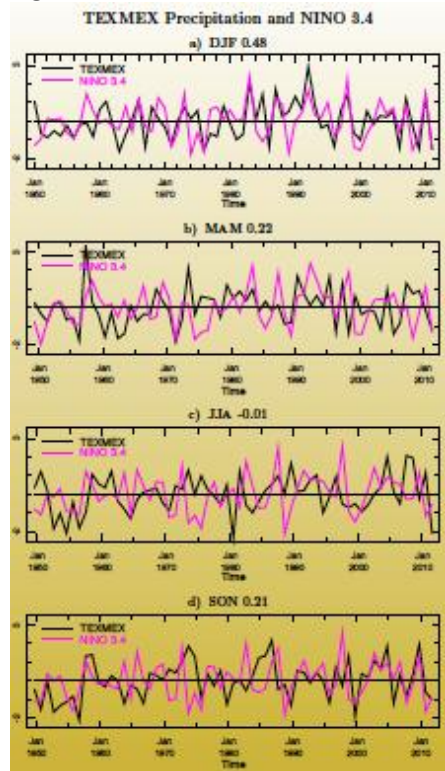

Figure 1. Analysis by MAPP PI Richard Seager and Jennifer Nakamura showing correlation between ENSO (NINO 3.4) and TEXMEX precipitation from 1980-2011 at different times of the year. Strongest correlations are in the winter months.

2. Monitoring

The U.S. drought monitor is the Nation's premier drought monitoring and decision-support platform. The drought monitor combines multiple inputs from "objective blends" with subjective inputs from analysts, affected communities and stakeholders. NOAA-funded work has led to the development of the North American Land Data Assimilation System experimental drought monitor, which is advancing the Nation's drought monitoring capabilities by combining state-of-the-science land surface models with high-quality meteorological datasets.
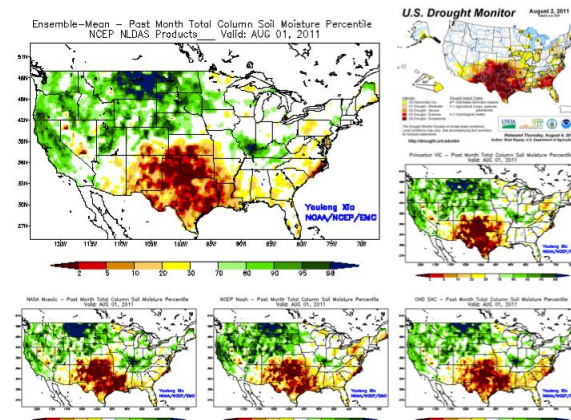

Figure 2. The August 1, 2011 NLDAS Drought monitor ensemble mean total column soil moisture percentiles (upper left) along with (clockwise from upper right) the U.S. Drought monitor, NLDAS/VIC, NLDAS/SAC, NLDAS/Noah, and NLDAS/Mosaic. Note that the NLDAS soil moisture percentiles are currently used to provide additional guidance to the US Drought Monitor.

3. Prediction

Predicting drought and its impacts as part of a drought early warning system requires an ability to predict precipitation and temperature anomalies as well as monitor current soil moisture (Figure 2), streamflow, and groundwater conditions. Recent NOAA-funded work is allowing experimentation with predictions from a system of U.S. models, the National Multi-Model Ensemble. Research is showing that this system has reasonable prediction skill for certain areas, such as the Tex-Mex region, at the three-month lead-time for December conditions. This relates directly to the DJF correlations shown in Figure 1 for the peak ENSO period.
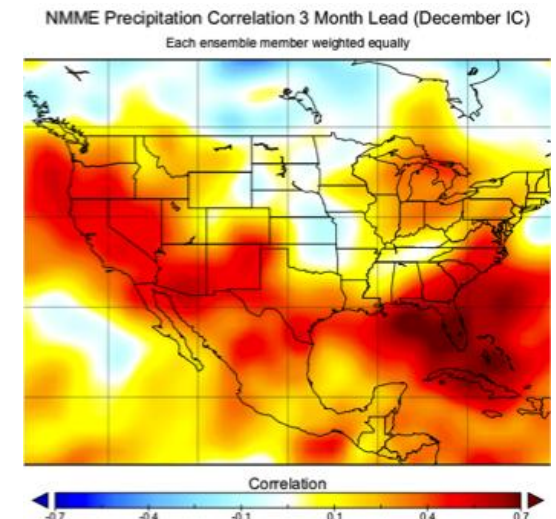

Figure 3. Analysis by MAPP PI Ben Kirtman and Johnna Infanti showing the NMME 3-month forecast precipitation correlations using a December initial condition. Note the highest correlations along the coasts and in the Tex-Mex region.